

## EVALUATING PLACEMENT DEPTH OF DIMETHYL DISULFIDE PLUS CHLOROPICRIN UNDER LDPE AND VIF MULCH

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### **Introduction**

Searching for methyl bromide alternatives in Georgia has been painful but fruitful. One alternative to methyl bromide that has been effective in managing nutsedge has been dimethyl disulfide in mixture with chloropicrin (DMDS). Although this fumigant will likely not receive full federal registration until at least 2009, research was conducted to determine how deep DMDS should be injected below the bed top that is to be covered with either standard polyethylene mulch (LDPE) or virtually impermeable film (VIF).

### **Materials and Methods**

An experiment was conducted in TyTy Georgia at the University of Georgia's Ponder Farm. The trial was conducted on a Tifton sandy loam soil with 94% sand, 2% silt, and 4% clay with a pH of 6.4 and 1% organic matter. Land was prepared by disking the trial area multiple times and then rototilling a 6 foot wide bed by 50 foot in length for each plot.

The experiment was a factorial treatment with the primary factor being mulch type and the secondary factor being fumigant placement depth. The two mulches included LDPE mulch (white on black, white surface up) or VIF (grey on black, grey surface up) as well as the two placement depths being 8 or 12 inches. DMDS (79% dimethyl disulfide:21% chloropicrin) was applied with a super bedder plastic layer using 3 injection knives on a 32 inch bed top at a rate of 62 gal per acre broadcast. A no fumigant comparison for each mulch type was also included for comparison purposes. The study was conducted in the fall of

2006 with fumigants applied on July 18 with a soil temperature of 88°F at 8 inches below the soil surface. In each plot, one row of Thunder cucumber were transplanted one foot apart down the row on August 4, 2006.

Visual crop injury, visual weed control, and the number of nutsedge shoots penetrating the mulch were measured throughout the season. Cucumber were harvested from the entire plot seven times.

### **Results and Discussion**

*Visual Cucumber Stunting:* Transplant holes were poked and cucumber were transplanted 18 days after fumigating. No cucumber injury was noted from any treatment throughout the season (data not shown).

*Nutsedge and Cucumber Response:* DMDS applied under LDPE mulch at 8 inches provided 18 to 19% greater visual nutsedge control than when DMDS was applied at a 12 inch depth (Table 1). Although there were no statistical differences in crop height or yield between these two treatments, trends clearly noted higher numerical yields when the fumigant was applied at 8 inches which is likely a response to greater nutsedge control with this system (Table 2).

DMDS placement depth was more forgiving under VIF as compared to LDPE mulch (Table 1). At 21 to 28 d after fumigating, no visual differences in nutsedge control or nutsedge penetration through the mulch were noted. However by 74 d after fumigating, visual nutsedge control was 6% better when DMDS was applied at an 8 inch depth. No differences in crop height or yield were

noted between these two treatments.

Soil temperatures just below the VIF were 4 to 11°F warmer in the afternoon than those noted just under the LDPE mulch (data not shown). This impact on soil temperature likely caused less cucumber fruit number and weights when comparing an 8 inch injection of DMDS under the two mulches (Table 2).

### Conclusions

Mixtures of dimethyl disulfide plus chloropicrin should be applied at a depth of 8 inches to obtain the greatest degree of nutsedge control.

**Table 1. Nutsedge response to DMDS applied at two depths under two mulches.\***

Fumigant	Mulch	Visual nutsedge control (%)		Nutsedge shoot emergence counts (#/plot)	
		28 DAT**	74 DAT	21 DAT	69 DAT
No Herbicide	LDPE	0 e	0 e	198 c	260 e
No Herbicide	VIF	50 d	43 d	115 b	215 d
DMDS at 8 inch depth	LDPE	93 b	90 b	10 a	59 b
DMDS at 12 inch depth	LDPE	75 c	71 c	68 b	151 c
DMDS at 8 inch depth	VIF	99 a	99 a	0 a	2 a
DMDS at 12 inch depth	VIF	98 a	93 b	0.3 a	21 ab

\*Values within a column followed by the same letter are not different at P < 0.05.

\*\*DAT = days after fumigating.

**Table 2. Cucumber heights and yield response to DMDS applied at two depths under two mulches.\***

Fumigant	Mulch	Pepper height	Cucumber yield over seven harvests	
		42 DAT**	Fruit number (#/plot)	Fruit weight (lb/plot)
No Herbicide	LDPE	19.9 c	174 c	100 c
No Herbicide	VIF	16.1 d	207 c	105 c
DMDS at 8 inch depth	LDPE	25.1 a	287 a	179 a
DMDS at 12 inch depth	LDPE	23.8 ab	267 ab	163 ab
DMDS at 8 inch depth	VIF	21.1 bc	245 b	149 b
DMDS at 12 inch depth	VIF	19.3 cd	249 b	151 b

\*Values within a column followed by the same letter are not different at P < 0.05.

\*\*DAT = days after fumigating.